# CIVIL QUALITY CONSULTANTS & ENGINEERS

(Buildings Geo-Tech & Highway Materials Testing Laboratory)
An ISO 9001: 2008 Certified Company

JAS-ANZ
ISO 9001:2000 CERTIFIED


Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 Date : 25.03.2016

## GRADATION FOR WMM
## MORTH TABLE-400-11

Client : **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.
Agency : **Sri. M.S Venkatesh,** Contractor, Bangalore.
Name of Work : Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore.

Date of Testing : 25.03.2016
Material Type : Wet Mix Macadam

Oven Dry.Wt 11606

| Is Sieve Size in mm | Weight Retained (gm) | Cumulative Weight Retained (gm) | Cumulative % of Retained | Cumulative % of Passing | Spec.Limits |
|---|---|---|---|---|---|
| 53 | 0 | 0 | 0 | 100 | 100 |
| 45 | 455 | 455 | 3.9 | 96.1 | 95-100 |
| 22.4 | 3985 | 4440 | 38.3 | 61.7 | 60-80 |
| 11.2 | 2216 | 6656 | 57.3 | 42.7 | 40-60 |
| 4.75 | 1286 | 7942 | 68.4 | 31.6 | 25-40 |
| 2.36 | 1146 | 9088 | 78.3 | 21.7 | 15-30 |
| 0.600 | 1242 | 10330 | 89.0 | 11.0 | 8-22 |
| 0.075 | 946 | 11276 | 97.2 | 2.8 | 0-8 |

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Executive Engineer
B.B.M.P Division
Yelahanka

For CIVIL QUALITY CONSULTANTS & ENGINEERS

Authorised Signatory


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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 Date: 25.03.2016

## Aggregate Impact Value
IS: 2386 Part IV

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of the Work | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| Type of Mix | Wet Mix macadam |
| Date of Testing | 25.03.2016 |

| Sl No. | Details | Trial No. 1 | 2 | 3 | Average |
|---|---|---|---|---|---|
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 375 | 377 | 379 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 86 | 88 | 90 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 289 | 289 | 289 | |
| 4 | Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$ | 22.93 | 23.34 | 23.75 | 23.34 |

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16

25.03.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of Work | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2011) |
| Type of Mix | Wet Mix Macadam |
| Sample ID | WMM Layer |
| Date of Testing | 25.03.2016 |

Result : Flakiness Index = **11.58%**

Elongation Index = **13.36%**

**Result : Combined Flakiness & Elongation index** **24.94%**

**Comments:**

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 Date : 25.03.2016

## ATTERBERG LIMITS TEST FOR WMM
## MORTH TABLE-400-11

Client : **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore.

Agency : **Sri. M.S Venkatesh,** Contractor, Bangalore.

Name of Work : Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore.

Date of Testing : 25.03.2016

Material Type : Wet Mix Macadam

**As per MORTH Table 400-13**

| Sl. No. | Particulars | Test Results | Standards as per Specifications |
|---|---|---|---|
| 1 | Liquid Limit | 22.50 | - |
| 2 | Plasticity Index, % | Non Plastic | 6.0% Maximum. |

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16

Date: 29.03.2016

## TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

| | | |
|---|---|---|
| **CLIENT** | : | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore. |
| **AGENCY** | : | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| **NAME OF WORK** | : | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| **SAMPLE ID** | : | Bitumen (Bituminous Concrete) |
| **PERIOD OF TESTING** | : | 29.03.2016 |

The results of the tests conducted on the Bitumen sample for Bituminous Concrete

| Sl.No | Description | Test Method as per IS | Test Result | Requirement as per IS: 73-2013 |
|---|---|---|---|---|
| 1 | Penetration at 25°C, 100g, 5 Sec 1/10 mm | IS: 1203-1978 (RA-2009) | 68 | 60 to 70 |
| 2 | Softening point, °C | IS: 1205-1978 (RA-2009) | 49 | Min. 45 |
| 3 | Ductility at 27°C, cm | IS: 1208-1978 (RA-2009) | 100 > | Min. 50 |
| 4 | Flash Point, °C | IS: 1209-1978 (RA-2009) | 298 | Min. 220 |

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29.03.2016

Job No.: CQCE/BBMP/MSV/W.No.04/2015-16

## Aggregate Gradation Test

IS : 2386 Part I

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of the Work | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| Sample I / D | Hot Mix Plant, Bangalore |
| Type of Mix | Bituminous Concrete |
| Date of Testing | 29.03.2016 |

Total Weight of Sample: **5380** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | JOBMIX Gradation as per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 19 | 0 | 0 | 0 | 100 | 100 | Gradation satisfies Bituminous concrete Grade-II specification as per MORTH |
| 13.2 | 495 | 9.20 | 9.20 | 90.80 | 79 - 100 | |
| 9.5 | 520 | 9.67 | 18.87 | 81.13 | 70 - 88 | |
| 4.75 | 685 | 12.73 | 31.60 | 68.40 | 53 - 71 | |
| 2.36 | 615 | 11.43 | 43.03 | 56.97 | 42 - 58 | |
| 1.18 | 585 | 10.87 | 53.90 | 46.10 | 34 - 48 | |
| 0.600 | 653 | 12.14 | 66.04 | 33.96 | 26 - 38 | |
| 0.300 | 574 | 10.67 | 76.71 | 23.29 | 18 - 28 | |
| 0.150 | 415 | 7.71 | 84.42 | 15.58 | 12 - 20 | |
| 0.075 | 430 | 7.99 | 92.42 | 7.58 | 4 - 10 | |

Total Weight of Sample: **4825** gm

| SIEVE SIZE, mm | Weight Retained, gm | % Retained | Cummulative % Retained | % Passing | JOBMIX Gradation as per MORTH | Remarks |
|---|---|---|---|---|---|---|
| 19 | 0 | 0 | 0 | 100 | 100 | Gradation satisfies Bituminous concrete Grade-II specification as per MORTH |
| 13.2 | 658 | 13.64 | 13.64 | 86.36 | 79 - 100 | |
| 9.5 | 485 | 10.05 | 23.69 | 76.31 | 70 - 88 | |
| 4.75 | 635 | 13.16 | 36.85 | 63.15 | 53 - 71 | |
| 2.36 | 540 | 11.19 | 48.04 | 51.96 | 42 - 58 | |
| 1.18 | 630 | 13.06 | 61.10 | 38.90 | 34 - 48 | |
| 0.600 | 547 | 11.34 | 72.44 | 27.56 | 26 - 38 | |
| 0.300 | 364 | 7.54 | 79.98 | 20.02 | 18 - 28 | |
| 0.150 | 274 | 5.68 | 85.66 | 14.34 | 12 - 20 | |
| 0.075 | 358 | 7.42 | 93.08 | 6.92 | 4 - 10 | |

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29.03.2016

## Aggregate Impact Value

IS: 2386 Part IV

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of the Work | Providing pot hole filling and patch repairs in Ward No 04, BBMP, Bangalore. |
| Source / Location | Hot Mix Plant, Bangalore |
| Type of Mix | Bituminous Concrete |
| Date of Testing | 29.03.2016 |

| Sl No. | Details | Trial No. | | Average |
|---|---|---|---|---|
| | | 1 | 2 | |
| 1 | Total weight of aggregate sample filling the cylindrical measure = $W_1$ g | 374 | 376 | |
| 2 | Weight of agregate passing 2.36 mm sieve after the test = $W_2$ g | 83 | 85 | |
| 3 | Weight of aggregate retained 2.36 mm sieve after the test = $W_3$ g | 291 | 291 | |
| 4 | Aggregate Impact value = percent fines<br>100* ($W_2/W_1$) percent | 22.19 | 22.61 | 22.40 |

Comments:

→ Maximum allowable Aggregate Impact value for Bituminous Concrete is 24%

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 29.03.2016

## DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of Work | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| Technical Reference | IS 2386(Part 1) 1963 (RA 2007) |
| Type of Mix | Bituminous Concrete |
| Date of Testing | 29.03.2016 |

Result : Flakiness Index = **12.36%**

Elongation Index = **14.15%**

Result : Combined Flakiness & Elongation index **26.51%**

Comments:

→ Maximum allowable Flakiness & El s

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16

29.03.2016

## Specific Gravity And Water Absorption Test
IS: 2386 Part III

| | |
|---|---|
| Client | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, |
| Agency | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| Name of the Work | Providing pot hole filling and patch repairs in Ward No 04, BBMP, Bangalore. |
| Type of Mix | Bituminous Concrete |
| Date of Testing | 29.03.2016 |

| Sl. No. | Details | Notation | Test Number | | | Mean Value |
|---|---|---|---|---|---|---|
| | | | Test 1 | Test 2 | Test 3 | |
| 1 | Weight of aggregate suspended in water with the basket | $W_1$ g | 2021 | 2023 | 2025 | |
| 2 | Weight of basket suspended in water | $W_2$ g | 755 | 755 | 755 | |
| 3 | Weight of saturated aggregate in water | $(W_1 - W_2) = W_3$ g | 1266 | 1268 | 1270 | |
| 4 | Weight of saturated surface dry aggregate in air | $W_3$ g | 2015 | 2017 | 2019 | |
| 5 | Weight of water equal to the volume of the aggregate | $(W_3 - W_4)$ g | 749 | 749 | 749 | |
| 6 | Weight of oven dried aggregate | $W_4$ g | 2009 | 2010 | 2011 | |
| 7 | Specific Gravity | $W_4/(W_3-W_4)$ | 2.682 | 2.684 | 2.685 | 2.684 |
| 8 | Apparent Specific gravity | $W_4/(W_4-W_4)$ | 2.704 | 2.709 | 2.714 | 2.709 |
| 9 | Water Absorption | $((W_3-W_4)*100)/W_4$ | 0.30% | 0.35% | 0.40% | 0.35% |

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0%

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 Date: 30.03.2016

## TEST REPORT ON STABILITY OF MIX

| | | |
|---|---|---|
| **Client** | : | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore. |
| **Agency** | : | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| **Name of the Work** | : | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| **Source of location** | : | Hot mix Plant, Bangalore |
| **Type of Mix** | : | Bituminous Concrete |
| **Date of Testing** | : | 30.03.2016 |

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

| Sl. No | Description | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-19) |
|---|---|---|---|---|
| 1 | Marshal Stability, Kn | 9.68 | 10.25 | 9 Kn (min) |
| 2 | Marshal flow, mm | 3.69 | 2.47 | 2 – 4 |
| 3 | Percent air voids in Mineral Aggregate | 13.36 | 14.52 | 13 – 15 |
| 4 | Voids in Compacted Mix | 4.58 | 5.36 | 3 – 6 |
| 5 | Percent Voids filled with Bitumen | 73.36 | 74.25 | 65 - 75 |
| 6 | Density, g/cc | 2.26 | 2.27 | -- |

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Job No.: CQCE/BBMP/MSV/W.No.04/2015-16 30.03.2016

## BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

| | |
|---|---|
| CLIENT | **Assistant Executive Engineer,** Yelahanka New Town Sub Division, BBMP, Bangalore. |
| AGENCY | **Sri. M.S Venkatesh,** Contractor, Bangalore. |
| NAME OF THE WORK | Providing pot hole filling and patch repairs in Ward No.04, BBMP, Bangalore. |
| SAMPLE ID | Hot Mix Plant, Bangalore |
| DATE OF TESTING | 30.03.2016 |

### BITUMEN CONTENT DETERMINATION

| Description | Sample 1 | Sample 2 |
|---|---|---|
| 1. Weight of Mixture before Test, g | 500 | 500 |
| 2. Weight of Mixture after Test, g | 469.5 | 470 |
| 3. Weight of Asphalt and Mineral matter Extracted, g | 30.5 | 30 |
| 4. Weight of Mineral Matter, g. | - | - |
| 5. Weight of Ash, g | - | - |
| 6. Weight of Bitumen Extracted, g. (corrected) | 30.5 | 30 |
| 7. Bitumen content in % | 6.10 | 6.00 |
| 8. Average | 6.05 | |

### GRADATION AFTER EXTRACTION

TABLE - 1

| SIEVE SIZE | Percent Passing, % | | JOBMIX |
|---|---|---|---|
| mm | Sample 1 | Sample 2 | Gradation |
| 19 | 100.00 | 100.00 | 100 |
| 13.2 | 95.36 | 96.41 | 79-100 |
| 9.5 | 82.52 | 83.97 | 70-88 |
| 4.75 | 66.36 | 67.41 | 53-71 |
| 2.36 | 55.78 | 56.24 | 42-58 |
| 1.18 | 45.63 | 46.54 | 34-48 |
| 0.6 | 33.47 | 34.52 | 26-38 |
| 0.3 | 24.63 | 25.41 | 18-28 |
| 0.15 | 16.87 | 17.52 | 12-20 |
| 0.075 | 5.49 | 6.53 | 4-10 |

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